Exhibit 23

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Latia Alexander v. Las Vegas Metropolitan Police Department, et al.

ESI Case Code # NLG24-026

Human Factors Report

by

Nancy L. Grugle, Ph.D., CHFP

October 28, 2024

A. INTRODUCTION

On January 10, 2020, Isaiah Williams was shot and killed during a Las Vegas Metropolitan Police Department (LVMPD) SWAT entry into an apartment at 3050 S. Nellis Blvd #21-1125 in Las Vegas, NV. Williams was asleep on the sofa at approximately 5:00 am when the LVMPD SWAT officers attempted to serve a search warrant pertaining to a crime unrelated to Mr. Williams. Within several seconds, LVMPD officers made an announcement, broke out a window in the apartment, struck the door with a battering ram five times, deployed two different noise flash diversionary devices, and forcibly entered the front door of the apartment. Williams fired a gun at officers as they entered the apartment. LVMPD officers then shot Williams and he died as a result of his gunshot wounds.

The purpose of my investigation is to evaluate, from a human factors perspective, Williams' ability to perceive, process, and respond to the SWAT tactics used prior to entering the apartment.

B. QUALIFICATIONS

I am a Human Factors expert associated with Evidence Solutions, Inc. My qualifications and experience as a human factors expert are outlined in my curriculum vitae, a copy of which is attached as Exhibit A.

I hold a Bachelor of Science in Industrial and Systems Engineering from Ohio University as well as a Master of Science and a Doctor of Philosophy in Industrial and Systems Engineering specializing in Human Factors from Virginia Tech. I have more than twenty years of experience as a Human Factors engineer in research, academia, industry and forensics. My experience includes, but is not limited to, the evaluation of fatigue and the effects of sleep deprivation on human behavior and performance as well as the effects of environmental and physical stressors on human performance.

My fee schedule is attached as Exhibit B. The invoices for my work to date on this case total $13,692.50

C. MATERIALS REVIEWED

- Complaint
- Timeline of unconstitutional dynamic entry
- Force Investigation Team Report
- Photographs of incident scene
- Photographs of Williams
- Clark County Coroner/Medical Examiner Autopsy report for Isaiah Williams
- Las Vegas Metropolitan Police Department Autopsy Report
- Scene diagram
- Certificate of Death
- Las Vegas Metropolitan Police Department Forensic Laboratory Report of Examination—Firearms
- Bodycam video for Russell Backman
- Bodycam video for James Bertucci

- Bodycam video for Brice Clements
- Bodycam video for Alex Gonzales
- Bodycam video for Kerry Kubla
- Bodycam video for James Rothenburg
- Product specification for CTS 7290-9 multi 9 Flashbang
- Deposition transcript for James Rothenburg, dated 7/17/24
- Deposition transcript for Alex Gonzales, dated 7/8/24
- Deposition transcript for James Bertuccini, dated 7/12/24

D. SITE AND INCIDENT DESCRIPTION

On January 10, 2020, Isaiah Williams was shot and killed during an LVMPD SWAT entry into an apartment at 3050 S. Nellis Blvd #21-1125 in Las Vegas, NV. Williams was asleep on the sofa at approximately 5:00 am when SWAT officers attempted to serve a search warrant pertaining to a crime unrelated to Mr. Williams. Within seconds, LVMPD officers made an announcement, broke out a window in the apartment, struck the door with a battering ram five times, deployed two different noise-flash diversionary devices, and forcibly entered the front door of the apartment. Williams fired a gun as the officers entered the apartment. LVMPD officers then shot Williams and he died as a result of his gunshot wounds.

The Las Vegas Police Department Force Investigation Team Report provided an incident timeline. It is my understanding that accuracy of the timeline may be disputed.

Time (hours)	Description of Event/Action	Source
0324	An investigation/follow-up call was created by Officer Kai Hoskins, P# 9303, for the area of Nellis Boulevard and Vegas Valley Drive.	CAD
0324-0448	SWAT officers and various members of LVMPD assigned themselves to the call.	CAD
0459:56	First announcements were made by SWAT personnel at the front door.	BWC
0500:04	The west window was broken out and a stun stick breach was inserted.	BWC
0500:06	The front door was rammed for the first time.	BWC
0500:10	The noise flash diversionary device was deployed.	BWC
0500:11	The front door was breached after five (5) strikes with the ram.	BWC
0500:12	Swat Team made entry into the apartment.	BWC
0500:14	Williams fired his first shot at SWAT Officer Kubla.	BWC
0501	SWAT Sergeant Garth Findley, P# 8712 broadcasted shots had been fired and an officer had been shot. Sergeant Findley requested additional units to the scene.	CAD
0502	Medical personnel arrived on the scene.	CAD
0504	Officer Kubla transported from the scene to UMC Trauma.	CAD
0509	Williams pronounced deceased by Search and Rescue Officer William Bridges, P# 15219.	CAD
0529	Two separate ShotSpotter calls were received from the area. (13 rounds / 15 rounds)	CAD

The Force Investigation Team Report provided an investigative summary of events. I have cited it for reference below.

> On January 10, 2022, at approximately 0500 hours, officers from the LVMPD Special Weapons and Tactics team (SWAT), arrived at 3050 S. Nellis Boulevard #21-1125 (The Boulevard Apartments), to serve a search warrant…
>
> Once the officers received pertinent information and their assignments, the team headed to the complex and surrounded the apartment. After several announcements of their presence before making entry, the breach officer began ramming the front door. Officers Rothenburg and Bertuccini were positioned outside of the west window of the apartment and deployed a stun-stick device through the window and activated a distract toward the living room roof. After five attempts with the ram, the SWAT team was able to make entry through the front door.
>
> As the team made entry, Isaiah Williams, who was lying on the living room couch, fired a handgun that was equipped with an extended magazine, at the entry team officers. Officer Kubla was the first officer to enter the apartment. Officer Kubla was shot multiple times and fell to the ground. Officer Clements was the second officer to enter, and he sustained a graze injury

to his right arm due to a bullet fragment. Officers exchanged gunfire with Williams as he continuously fired his handgun toward the officers inside. Officers Bertuccini and Rothenburg held their positions outside of the west window. Williams aimed his firearm and fired his handgun toward Officer Rothenburg, striking the ballistic shield that Officer Rothenburg was holding for cover. Officer Rothenburg returned fire toward Williams' direction. Wiliams was struck multiple times by gunfire. Williams became incapacitated and was taken into custody. Medical personnel were called for all injured persons…

Officer Bertuccini deployed the stun stick inside the window and the SWAT team made entry through the front door. Officer Rothenburg stated an additional distract was deployed outside the apartment near the balcony area. Once the team entered, Officer Rothenburg heard distinct gunshots from inside the apartment. Officer Rothenburg's view was obstructed by the smoke from the distract and the window's blinds and curtains, but he was able to see the muzzle flash toward his team, coming from the northwest corner of the apartment.

Officer Bertuccini was assigned to the stun stick team which deploys a noise flash diversionary device. Officer Bertuccini's role was to insert the device into the structure after the second search warrant announcement.

Officer Bertuccini explained his assignment was to break the window and place the diversionary device high in the room, close to the ceiling. After the device was activated, Officer Bertuccini was to manually clear the remaining glass from the window. The device activated along with another nine-bang distract. Once the entry team was inside, Officer Bertuccini heard additional "bangs" which he recognized as gunshots.

Crockett said he was asleep in the bedroom when something woke him. He jumped up and was immediately taken to the ground by officers. Once in custody, he was removed from the residence. Crockett stated he did not know why the police were at the residence and never heard anything before being taken to the ground by officers.

E. ANALYSIS

LVMPD officers testified that Williams should have understood that police officers were at the apartment to serve a search warrant and that Williams intended to shoot at the police officers as they made entry into the apartment.

Officer James Rothenburg testified:

Q. As we sit here today, do you have any evidence or facts that would indicate Mr. Williams understood it was police officers coming through that unit?
A. I would assume based off of the announcements given. (JR, 35-6)

Q. You think that six seconds of announcements is sufficient to give a sleeping person inside an apartment notice and the time to understand that police officers are coming through the door?
A. I believe so, yes.
Q. Okay. And you think that especially --that six seconds, then it is also punctuated with a distract device and what they call it, the nine banger going off, you think that that's also sufficient time for somebody to understand that?
A. Yes. (JR, 36)

Q. Do you think it's a reasonable expectation that somebody who's inside a small unit full of smoke and having nine bangers and a stun stick go off would continue to be able to assess and understand announcements that are being made?
A. Yes. (JR, 126)

Q. Okay. So even though you testified earlier than the intent is to distract somebody, to surprise them, to overwhelm them, you think that they would still have the mental capacity to be able to understand announcements that are being made?
A. Off of my experience, yes. (JR, 126-7)

Q. Do you think somebody that's sleeping· ·inside an apartment that they don't normally live at can automatically assess within seconds what kind of announcement is being made?
A. Off of my previous experience, yes. (JR, 141)

Officer James Bertucci testified:

Q. It implies, don't you believe, that maybe he didn't really understand what was going on?
A. I don't feel he didn't understand. I feel he understood exactly what was going on. They were sounding short -- search warrant numerous times. And then he was immediately -- our guys were immediately met with gunfire. (JB, 172)

Officer Alex Gonzales testified:

Q. So if we go to trial, is it your intent to testify that you believe Mr. Williams intended to shoot at police officers?
A. Yes, ma'am. (AG, 103-4)

LVMPD officers' assertion that Williams should have understood that police officers were serving a search warrant and that Williams intentionally shot at police officers is unscientific and unreliable for the reasons provided below.

The purpose of my investigation is to evaluate, from a human factors perspective, Williams' ability to perceive, process, and respond to the SWAT tactics used prior to entering the apartment. Human Factors is the scientific study of human physical and mental capabilities and limitations and the application of that knowledge to the design and analysis of products, processes, and systems for safe and efficient use (1). Human factors engineers conduct hazard analyses as well as design and evaluate products and systems to address human factors issues including safety and human performance.

In this case, LVMPD SWAT conducted their entry at 5:00 am while Williams was asleep on the sofa inside the apartment. An analysis of the LVMPD timeline of events and bodycam video from LVMPD officers indicates that SWAT made an announcement prior breaching the front door of the apartment. The window was broken approximately 3-6 seconds after the first announcement followed by the first door strike approximately 2 seconds later. The flash bang was deployed 4 seconds after the first door strike and entry was made 2 seconds after that (6 seconds after first door strike). Williams fired approximately 2 seconds after entry was made into the apartment. Both the timing of the SWAT raid (i.e., at 5 a.m., while Williams was asleep) and LVMPD's deployment of flash bang devices impaired Williams' ability to perceive and process what was happening as SWAT prepared to make entry into the apartment.

From a human factors perspective, it is critical to consider that Williams would have been unlikely to hear or comprehend the verbal announcement made by the SWAT officer prior to the use of the battering ram or the flash bang device. Williams was asleep inside the apartment and the verbal announcement was likely not loud enough to wake a person who was sleeping on the other side of an exterior apartment wall. Even if the announcement did wake Williams, it is unlikely that Williams would have been able to comprehend exactly what the officer said. That is because, during sleep, there is no impact of reasoning on the interpretation of noise. Therefore, a person who is awakened by voices will not be able to interpret the voices as anything other than "noise." In other words, they will not hear words or comprehend the meaning of any words, they will only hear "noise" in the form of voices (2). Put simply, it is unlikely that Williams was able to comprehend what was being announced outside the apartment while he was asleep on the couch. Consistent with my analysis above, Crockett, the other individual asleep in the apartment prior to the SWAT entry, stated that "he did not know why the police were at the residence and never heard anything before being taken to the ground by officers."

The importance of Williams' inability to hear or comprehend the verbal announcement by LVMPD officers cannot be overstated. That is because, without hearing and understanding the announcement that police officers were there to serve a search warrant, Williams had no mental or logical reference point from which to understand, interpret, or comprehend the breaking of the window, the use of a battering ram on the front door, or the deployment of the flash bang devices inside and outside the apartment. Therefore, while it is likely that the broken window, door strikes, and/or flash bang devices woke Williams from his sleep, he did not have any information available to him to interpret or understand why the window was broken, why the door was being rammed, or why the flash bang device

was deployed. As a result, Williams' response to the situation was not based on any information or understanding that police attempting to enter the apartment to serve a search warrant.

Furthermore, Williams' ability to understand the situation as it unfolded was impaired because the LVMPD SWAT raid abruptly awakened him from sleep using the battering ram and flash bang devices. The temporary disorientation and decline in performance and/or mood after awakening from sleep is referred to as "sleep inertia" (SI). Immediately following awakening, people exhibit transitory hypovigilance (reduced vigilance), confusion, disorientation of behavior, and impaired cognitive and sensory-motor performance (3). The magnitude of sleep inertia is dependent on several factors including prior sleep duration, sleep stage prior to awakening, and the existence of prior sleep deprivation. Sleep inertia is also dependent on the time of day when awakening occurs (4).

The effects of sleep inertia on performance have been shown on a wide variety of tasks including simple motor tasks, sensory-motor tasks, and cognitive tasks (3). Research has shown that higher-order cognitive tasks that require greater attentional load are more susceptible to the effects of sleep inertia than simple tasks. For example, studies have reported the effects of sleep inertia on complex cognitive performance tasks such as memory, calculations, decision-making, and a spatial-configuration visual search task (5). In general, cognitive tasks involving high attentional load seem to be much more affected by SI than simple motor ones with performance accuracy being more impaired than speed (3). Perceiving and understanding a forced entry by LVMPD would be considered a situation requiring a high attentional load.

Because Williams was asleep prior to the SWAT raid and was abruptly awakened by the use of the battering ram and/or flash bang devices, it is more likely than not that Williams' higher-order cognitive function (e.g., his ability to process and understand what was happening) was impaired by sleep inertia. As a result, it is unlikely that Williams would have understood who was attempting to enter the apartment (i.e., LVMPD) or why someone was attempting to enter the apartment (i.e., to serve a search warrant). Thus, Williams' response to LVMPD SWAT's entry into the apartment would not have been based on a complete or accurate understanding by him of the circumstances or the events as they unfolded.

Moreover, LVMPD SWAT's use of flash bang devices impaired Williams' ability to hear, see, and process the events preceding the SWAT entry into the apartment as they unfolded. In general, flash bang devices are used by police departments (and SWAT teams, in particular) to help them gain an advantage when conducting room entries. The "advantage" sought by the police is primarily to disorient and confuse the occupants of a room and slow their reaction speed, thereby giving officers additional time to assess and respond to suspects' behavior (6).

The typical flashbang grenade's explosive energy generates a deafening boom accompanied by a brilliant flash of light that can be temporarily blinding. There are three main components of a

flashbang—the flash (or light), the bang (or sound), and the blast overpressure (or a sudden increase in air pressure). Flashbangs cause a range of human effects including immediate physiological effects on humans such as eyeblink and intermediate psychophysiological effects such as distraction and disorientation. During normal use, it is generally not possible to separate out the effects of each component because of the complex interactions among them.

A study by Fedele, Bhatt and Morrison (2021) summarized the psychological effects of flashbang grenades (FBGs) in terms of how the visual and auditory effects combine with a person's stress response to disorient and confuse targeted individuals (7). The study explains:

> FBGs can evoke acute stress, which has been shown to impair memory and cognitive processes. These cognitive impairments potentially contribute to disorientation and confusion of targeted individuals. The effect that acute stress has on cognition depends, in part, on the intensity of the stressor. As intensity increases, higher order cognitive processes such as decision-making suffer.
>
> The cognitive and behavioral effects of sudden noise exposure are inextricably tied to the stress response—acute noise, the stress response, and psychological and behavioral performance depend on several situational factors, including the individual's task, operational setting, and the individual factors, such as age, gender, genetic make-up. Individual differences are a significant component that influences one's response to noise—**the same noise can elicit wildly different responses from different people [emphasis added].** Anecdotal evidence suggests that one's background (e.g., prior FBG exposure, PTSD) could dramatically affect a person's reaction to an FBG.
>
> A sudden acoustic stressor (e.g., FBG) can change a person's behavior by lowering performance or affecting behavior toward others via overall psychological and cognitive stress. Generally speaking, noise makes cognitive tasks more difficult, indicating some sort of psychological stress, while also narrowing attention. Further, task strategy is also affected, with noise increasing speed but reducing accuracy, thus leading to more errors, an effect sometimes attributed to an increase in arousal level. That is, motor tasks might increase in speed, but communication tasks might break down altogether.
>
> The flash effect impairs vision and potentially disturbs concentration, which translates to disrupted behavior (e.g., disorientation and confusion). For example, the dazzling effect of light is known to increase reaction times in automobile drivers and also heavily disturb pilot behavior. Other research supports the finding that human subjects experiencing dazzling effects from lights report discomfort and visual impairment that contribute to impaired concentration on performance tasks (e.g., increase reaction time), suggesting that dazzling lights can impair brain functioning.

The stress response can also affect vision for individuals exposed to an FBG but not affected by the flash (e.g., not looking toward the detonation or eyes closed), a likely scenario. The introduction of stressors has been shown to interfere with peripheral target acquisition due to the activation of the sympathetic nervous system; this is often called "tunnel vision" (defined as a loss of peripheral vision with relative preservation of central vision, resulting in a constructed circular field of view. Tunnel vision narrows one's visual field and may cause a distorted or altered understanding of one's environment, thereby affecting performance (e.g., target accuracy). Similarly, the stress of exposure to FBGs could cause one's visual acuity to decrease, even if not exposed to the flash per se (e.g., the target is wearing goggles or isn't looking at the location of detonation).

Madhavan and Dobbins (2018) performed a path analysis of the physiological, psychological, and performance effects of flashbang grenades (8). They broke down the effects into several categories including overpressure effects, hearing effects, vision effects, startle effects, and affective/emotional shift. A major finding of their analysis is that negative shifts in affect/emotion (e.g., fear, anger) play a critical role in moderating the relationship between the immediate effects of flashbangs and final performance outcomes by narrowing attentional focus and distracting attention away from planned goals. Second, the visual system dominates other systems such as hearing and touch by suppressing or enhancing the sensitivity of other systems and weakening or strengthening other responses such as startle. Strong vision effects suggest that the "flash" may have the potential to lead to more immediate impact than the "bang" when the subject is looking toward the flashbang. The following sections from the Madhavan and Dobbins (2018) analysis summarize some of the effects for each of those categories.

Overpressure Effects

A blast is characterized by a sudden increase of air pressure (i.e., overpressure) followed by an almost immediate decrease in pressure and blast wind. In an open field, the energy of the blast waves decreases exponentially from the origin of the blast. However, indoors, blast waves rebounding off walls and rigid objects result in complex pressure waves which may enhance the original blast wave (DePalma et al. 2005). Particularly for the thorax, the traumatic loading of the chest wall by the blast causes a shock wave that propagates into the lung, causing disruption, hemorrhage, pulmonary contusion, and subcutaneous emphysema. Pulmonary injuries may be life-threatening if extensive.

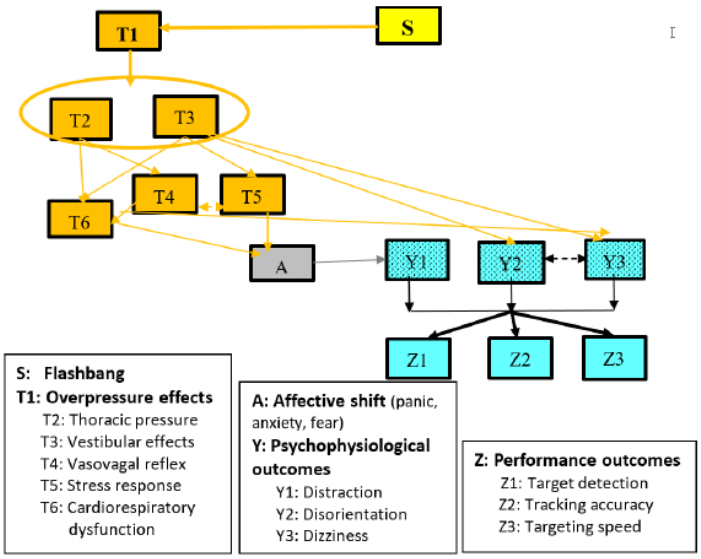

Figure 1. Effects of Blast Overpressure on Performance Outcomes

The effects of overpressure are parasympathetic or sympathetic. The parasympathetic response results from thoracic pressure (**T2**) and impacts to the vestibular system (**T3**) which is responsible for maintaining the body's sense of balance and spatial orientation. Thoracic pressure leads to hyperinflation of the lungs and, together with vestibular effects, leads to cardiorespiratory dysfunction (**T6).** Cardiorespiratory dysfunction (**T6**) in turn can lead to palpitations and dizziness (**Y3**), and in extreme cases, loss of consciousness.

The vasovagal reflex, also triggered by increasing thoracic pressure (**T2**), is characterized by rapid breathing, bradycardia (slowing down of heart rate to less than 60 beats per minute), and hypotension (abnormally low blood pressure). Stimulation of the vestibular system (**T3**) may also directly result in the activation of the sympathetic nervous system, which also influences the stress response (**T5**). Sudden surges in levels of physiological and psychological stress (or "shock") in combination with cardiorespiratory strain (**T6**) trigger negative emotions such as anxiety, panic and fear, denoted by affective shift (**A**) in Figure 1, which, in turn leads to distraction (**Y1**). Simultaneously, overpressure effects on the vestibular system (**T3**) lead to disruptions in balance, movement, and spatial orientation leading to feelings of disorientation (**Y2**) and dizziness (**Y3**). Distraction (**Y1**), disorientation (**Y2**) and dizziness (**Y3**) exert measurable effects on performance by weakening the probability of target detection (**Z1**), the accuracy of target tracking (**Z2**) and the speed of responding to a target (**Z3**).

Hearing Effects

Aural Pain

Impulse noises, when loud enough, can produce significant physiological effects associated with pain. Flashbang grenades generate noise levels far above those considered comfortable for the human ear, and even a brief stimulus duration is enough to cause great discomfort if not permanent damage. While hearing discomfort can occur around the 110 dB mark, the typical threshold for aural pain sits around 120–140 dB. In this case, the CTS 7290-9 multi 9 flashbang device emitted approximately 165-180 dB of noise. For reference, a jet engine at takeoff emits approximately 150 dB and a shotgun emits approximately 170 dB.

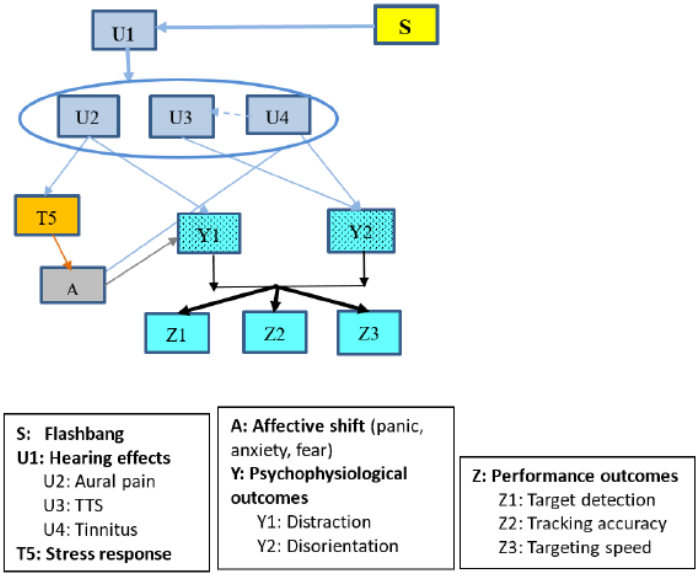

Figure 2. Effects of Flashbang Exposure on Hearing and Subsequent Performance Outcomes

This experienced aural pain is denoted by **U2** in Figure 2. Pain demands attention; therefore, in addition to the immediate stress response (**T5**) from experienced pain and resultant negative shift in affect (denoted by "affective shift" **A**), a more direct impact on performance through distraction (**Y1**) should occur. Distraction results in impaired ability to detect (**Z1**) and track targets (**Z2**) and increased time to react (**Z3**) once targets are detected.

Temporary Threshold Shift

Blast exposure substantially raises the risk for temporary and permanent hearing loss in humans. A temporary threshold shift (TTS) is a temporary shift in the auditory threshold that may occur suddenly after exposure to a high level of noise, a situation in which most people experience reduced hearing. TTS is denoted as **U3** in Figure 2. **TTS results in temporary hearing loss and is often accompanied by tinnitus [emphasis added].** TTS is normally caused by exposure to intense or loud sounds and is relatively independent of exposure duration. It may

result from exposure to loud noise for short durations (such as an explosion) or for longer durations (such as a concert). TTS tends to be maximal at the exposure frequency of the sound. Full recovery from TTS can be achieved in approximately 2 minutes for blast exposure, depending on the severity of the TTS. TTS (**U3**) leads to a temporary state of disorientation (**Y2**) due to a temporary disruption in hearing ability, or "deafness." Disorientation slows down response time (or, targeting speed; **Z3**) and weakens the ability to detect (**Z1**) and track a target (**Z2**).

Vision Effects

One of the most prominent characteristics of a flashbang grenade is the "flash"—a brief but brilliant display of light that is intended to be immediately blinding to the observer.

Ocular Pain

Human subjects display discomfort in response to sudden, intense light. These responses can include squinting, blinking, wincing, or averting gaze).

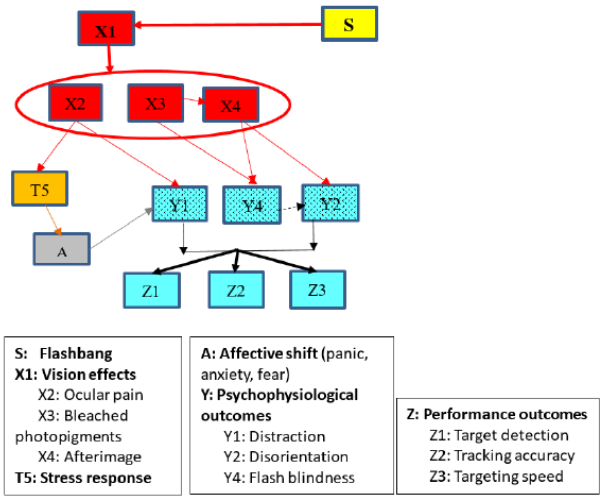

Figure 5. Effects of Flashbang Exposure on Vision Effects and Subsequent Performance Outcomes

The impending tissue damage signaled by ocular pain triggers a stress (or shock) response (**T5**) to optimize the chances of escaping or eliminating the given threat and creates a state of negative affect (**A**). Simultaneously, there is a more direct impact on performance outcomes by way of distraction. The momentary distraction caused by physical pain to the eye leads to impaired ability to visually detect (**Z1**) and track targets (**Z2**) and slows down speed of targeting (**Z3**).

Bleached Photopigments

Exposure to sudden brilliant light triggers the process of light adaptation in the human eye wherein the retinal pigment rhodopsin absorbs the light energy. Bleaching of photopigments (**X3**) limits the degree to which the rods are stimulated, decreasing their sensitivity to bright light. This leads to a temporary state called "flash blindness" (**Y4**)—a reversible change in the adaptational state of the eye to a sudden increase in the ambient illumination. During this temporary state of blindness, virtually nothing is visible except a positive or negative afterimage (**X4**).

Afterimage

One of the causes of the blinding effect described above is the afterimage (**X4**) created by the flash on the retina. An afterimage is a visual phenomenon in which some features of an image persist even after the visual stimulus ceases. Specifically, after a flash of bright light, cells within the light-exposed area of the retina become less sensitive to light compared to those outside that area, so they subsequently fail to respond appropriately to normal levels of light. Exposure to bright light can produce an afterimage lasting for minutes to hours to days depending on the intensity and duration of the source light. Afterimages caused by expedient lights such as flashlights and sudden flares from flashbangs has been shown to provoke spatial disorientation (**Y2**) for varying lengths of time.

Startle Effect

The shock or "startle" element associated with flashbangs can trigger varying degrees of psychological and physiological distress. Arguably, the "startle" alone may result in more serious consequences (e.g., stress to vital organs such as the heart) than the physical effects of the flashbang per se. In humans, the startle response is most commonly elicited by auditory stimuli. The startle response, typically a response to unexpected stimuli is the consequence of involuntary activation of the motor tracts that is generated in the brainstem and is the fastest known generalized motor reaction of humans and animals.

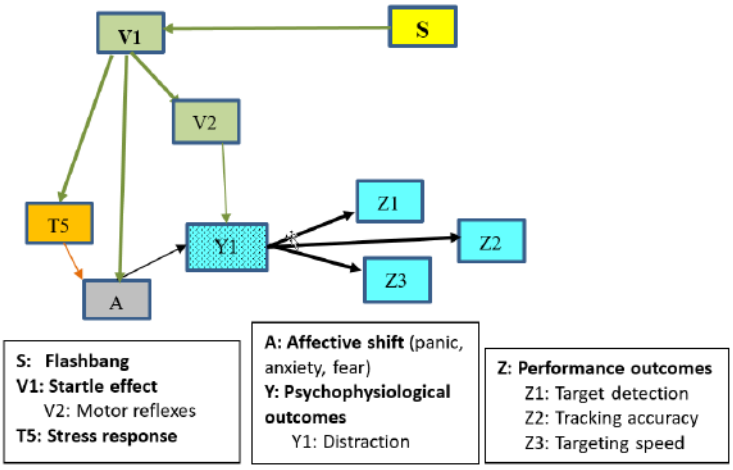

Figure 3. Effects of Flashbang Exposure on the Startle Effect and Subsequent Performance Outcomes

The startle response (**V1**) typically leads to a motor reflex (**V2**) that comprises an early brief and generalized muscle contraction lasting a few milliseconds. Specifically, this motor reflex is characterized by rapid activation of the facial and skeletal muscles, leading to a whole body flinch within a few milliseconds. This is followed by a more elaborate motor activity, such as turning of the head in the direction of the stimulus, resulting from the central integration of all sensory information conveyed by the stimulus. The startle motor reflex leads to distraction (**Y1**) that in turn weakens the ability to detect (**Z1**) and accurately track a target (**Z2**), and significantly slows down targeting speed (**Z3**). Startle also leads to an increase in negative affect (denoted by "affective shift" **A)** wherein feelings of panic, fear and anxiety are spontaneously triggered as a result of the stress (**T5**) generated by a startle-eliciting stimulus. As noted in previous sections, a negative shift in affect creates a state of distraction (**Y1**) which, in turn, leads to impaired performance outcomes (**Z1, Z2, Z3**).

Although simple responses like target monitoring might recover relatively quickly (in approximately 2 seconds) upon removal of the startle eliciting stimulus, **startle has been found to impair higher level information processing such as problem solving and decision making for as long as 30 seconds to 60 seconds after the startling stimulus has been removed [emphasis added]**. This duration exceeds the amount of time that Williams had to perceive and respond to the SWAT entry tactics used by LVMPD.

Affective/Emotional Shift

Affective shift, refers to a change in the emotional state of the observer as a function of exposure to the flashbang. A substantial body of research has shown that the startle effect, in particular, is potentiated by situations that involve the processing of aversive information. Specifically, the magnitude of the eyeblink reflex (elicited by a "bang") increases when an

individual concurrently experiences a negative emotion. The "aversive stimulus → negative affect (fear) → startle" relationship has been termed "fear potentiated startle" and has been consistently demonstrated in experiments with animal subjects.

In parallel with the startle effect that comprises motor reflexes such as fast contractions of skeletal and facial muscles and closing of the eyes, the presentation of a "bang" leads to tinnitus and the associated blast overpressure leads to a spike in reported stress levels and the acceleration of heart rate. In laboratory settings, the stimuli that are associated with this combination of reflexes are aversive and have been suggested to induce a state of fear or anxiety. A sudden surge in negative affect serves as a powerful source of distraction from pre-planned actions (such as intent to shoot a target); this state of distraction, in turn, will exert a significant weakening influence on performance outcomes.

Physiological and Psychological Responses vs. Behavior

It is critical to understand that while the physiological and psychological effects of flashbang devices have been researched and documented in the scientific literature, there is no scientific research that has specifically studied or analyzed how a targeted person will subsequently *behave* after being exposed to a flashbang device. In other words, while a flash bang grenade may successfully impair the vision and/or hearing of the targeted person and temporarily disorient or distract them, the targeted person's subsequent behavior cannot reliably be predicted (e.g., whether they will be pacified, whether they will respond aggressively, etc.). To that end, there is no scientific research to indicate that a person subjected to a flash bang grenade will be subdued or pacified, will be more compliant, will surrender without a fight, etc. Therefore, while flashbang grenades may impair and disorient a targeted individual, some individuals may fight, some may flee, and some may freeze. Mojica (2023) explains:

> *NLWs [Non-lethal Weapons] have a complicated relationship with the intended behavioral objectives (e.g., preventing people from moving toward a restricted area). Knowledge of the pre-existing goals and environments of people targeted with an NLW can inform decisions about which type of NLW is appropriate for a given situation. For example, smoke is effective if the objective is to prevent people from performing a task that requires visual information (e.g., driving) but is ineffective at preventing verbal communication.* ***Moreover, there are individual differences in how people react to a given dissuasive technology. For example, after a flashbang detonates nearby, some people may immediately flee while others are undeterred [emphasis added]****.*
>
> *Flashbangs emit bright light, loud impulse noise, and blast overpressure, causing anyone near the flashbangs detonating to experience significant physiological reactions. People exposed to flashbangs experience a startle reflex, an involuntary reaction that starts with a distinctive eye blink and ends with leg contractions, and their autonomic system activates, resulting in*

> *significant physiological changes such as increased heart and breathing rates that facilitate fight-or-flight responses toward or away from.*
>
> *People's internal experience inside this extreme environment may also potentiate initial physiological reactions to the NLWs, especially if they are concerned that an escalation of force may occur. Because encounters of this nature necessitate that one team or the other will likely die,* ***the fear of death or serious bodily injuries could cascade into a fear-potentiated response, resulting in cognitive impairments that drastically reduce environmental awareness and rational decision-making [emphasis added].*** (9)

To that end, flashbang devices are often deployed in the field based on a scientifically unsupported assumption that the physiological or psychological effects on targeted individuals will be effective in terms of making room entry safer. However, there is no scientific evidence that this is actually the case. Blair and Martaindale (2017) explain:

> *To date, no research has sought to study methods to improve officer safety while performing room entries…*
>
> *When conducting a room entry, the vast majority of suspects that officers encounter simply do not attempt to fight the police. No matter what techniques or tactics were used, the suspect simply surrenders. Thus, the tactics may appear to be sound, but we cannot be certain whether they would work if the suspect had fought. It is only those rare cases where the suspect attempts to fight that we receive feedback about the effectiveness of tactics. Too often, this feedback suggests that the tactics are ineffective. Unfortunately, the evidence of this ineffectiveness is injured and dead officers. (6)*

In this case, LVMPD SWAT's deployment of flash bang devices impaired Williams's hearing and vision and disoriented him in the seconds prior to officers entering the apartment. The physiological and psychological effects of the flash bang devices on Williams' hearing, vision, and cognitive function make it unlikely that Williams could have heard the officers verbal commands or announcements after the flash bang devices deployed. It is also unlikely that Williams would have been able to see the officers or their uniforms in any detail (e.g., see the words "Police" or "SWAT") or that Williams fully comprehended or understood the circumstances he was confronted with (i.e., LVMPD SWAT was attempting to serve a warrant). In addition, the use of flashlights aimed at Williams would have also decreased his ability to see the officers or any words on their uniforms. Lastly, it is likely that the flash bang devices induced a negative emotional reaction (e.g., fear, anger) to which Williams responded by firing his gun as officers entered the apartment.

It is important to note that Williams' ability to grab his gun and fire on the officers as they entered the apartment is not a valid or reliable indication that he was fully aware of the fact that LVMPD SWAT

officers were attempting to serve a search warrant. To the contrary, Williams' actions in grabbing and firing his gun are consistent with a person who was abruptly awakened from sleep, experienced the effects of sleep inertia, experienced the disorienting physiological and psychological effects of the flash bang device including a negative emotional response, and reacted by successfully performing a simple motor task with relative speed.

In summary, Williams's response in firing on the LVMPD SWAT officers as they entered the apartment is consistent with the known physiological and psychological effects of being abruptly awakened from sleep and from being exposed to a flashbang grenade in an enclosed space. Therefore, it is unreasonable, from a scientific perspective, to expect Williams to have accurately or fully comprehended that LVMPD SWAT was serving a search warrant at the apartment or to expect Williams to have been subdued or pacified in response to the flashbang devices.

F. FINDINGS

Within the bounds of reasonable scientific certainty, and subject to change if additional information becomes available, it is my professional opinion that:

- LVMPD officers' assertion that Williams should have understood that police officers were serving a search warrant and that Williams intentionally shot at police officers is unscientific and unreliable.
- Williams' ability to understand the situation as it unfolded was impaired because LVMPD SWAT abruptly awakened him from sleep using the battering ram and flash bang devices.
- LVMPD SWAT's use of flash bang devices impaired Williams' ability to hear, see, and process the events preceding the SWAT entry into the apartment as they unfolded.
- Williams' ability to grab his gun and fire on the officers as they entered the apartment is not a valid or reliable indication that he was fully aware of the fact that police officers were attempting to serve a search warrant.
- Williams' response in firing on the LVMPD SWAT officers as they entered the apartment is consistent with the known physiological and psychological effects of being abruptly awakened from sleep and from being exposed to a flash bang grenade in an enclosed space.

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